2009-10-27 g-2 Meeting WH9SE

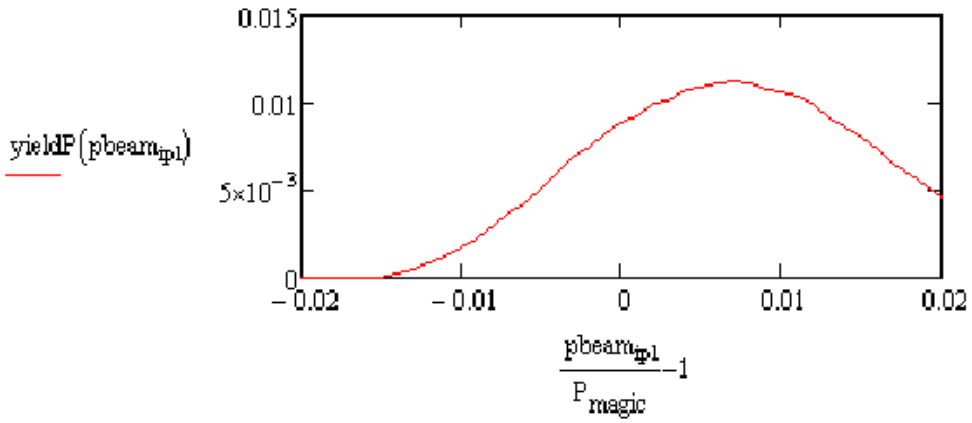
Tuesday, October 27, 2009
8:04 AM

- WH9SE Libra Conference Room
- Present
  - Fermi: Steve, Chris, Me
  - Phone: Mike Syphers
  - Video: Lee,
- For PAC, need to determine Flux, since it determines how long it takes to run. Know the cost.
- Vladimir Presentation (MuonYieldSimul.pdf)
  - Beta function that costed out. 3x smaller than existing line. 6m is what proposed change, 20m is close to what AP2 is now. Vladimirs paper shows 5m and 20m.

βx=βy=5m:

$A_\mu := 40 \qquad \delta pp_\mu := 0.006 \qquad \delta pp_\pi := 0.01 \qquad TwissX := Fx \qquad TwissY := Fy$

$$yieldP(x) := \frac{rows\left(SelectM\left(Z, x, A_\mu, \delta pp_\pi, \delta pp_\mu, TwissX, TwissY\right)\right)}{Np}$$

- 

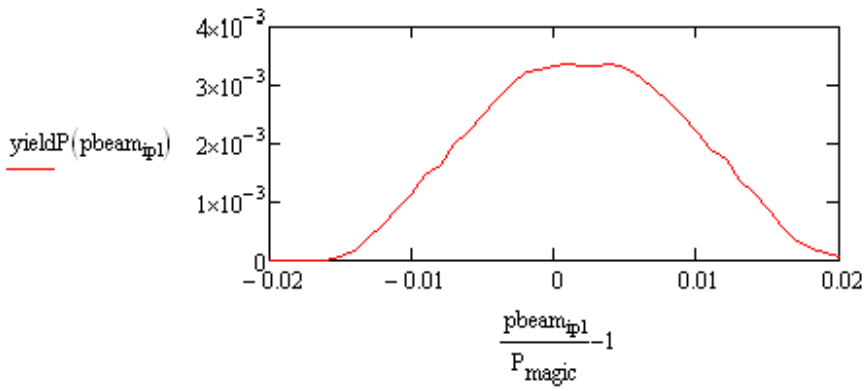
  - Taking central value of beam, +- 1%,
  - Muon yield when he tunes the beam.
  - Width is larger than 1%, choice of box 1%? Had he chosen a wider box, yield would have been greater.
  - Some contribution outside of +-1%
  - Next page

βx=βy=20m:

$\beta_x = 20\,m \qquad \alpha_x = 0 \qquad \beta_y = 20\,m \qquad \alpha_y = 0$

$A_\mu := 40 \qquad \delta pp_\mu := 0.006 \qquad \delta pp_\pi := 0.01 \qquad TwissX := \begin{pmatrix} \frac{\beta_x}{m} \\ \alpha_x \end{pmatrix} \qquad TwissY := \begin{pmatrix} \frac{\beta_y}{m} \\ \alpha_y \end{pmatrix}$

$$yieldP(x) := \frac{rows(SelectM(Z,x,A_\mu,\delta pp_\pi,\delta pp_\mu,TwissX,TwissY))}{Np}$$

- 

- Muon exceptance Au=40
- Yield vs Momentum Spread
- Need to make table as 20m.
- No contribution outside the +-1%

Therefore, pions with momentum outside 1% of Pmagic do not contribute to the muon collection.

Simply plugging these numbers into the total yield gives this:

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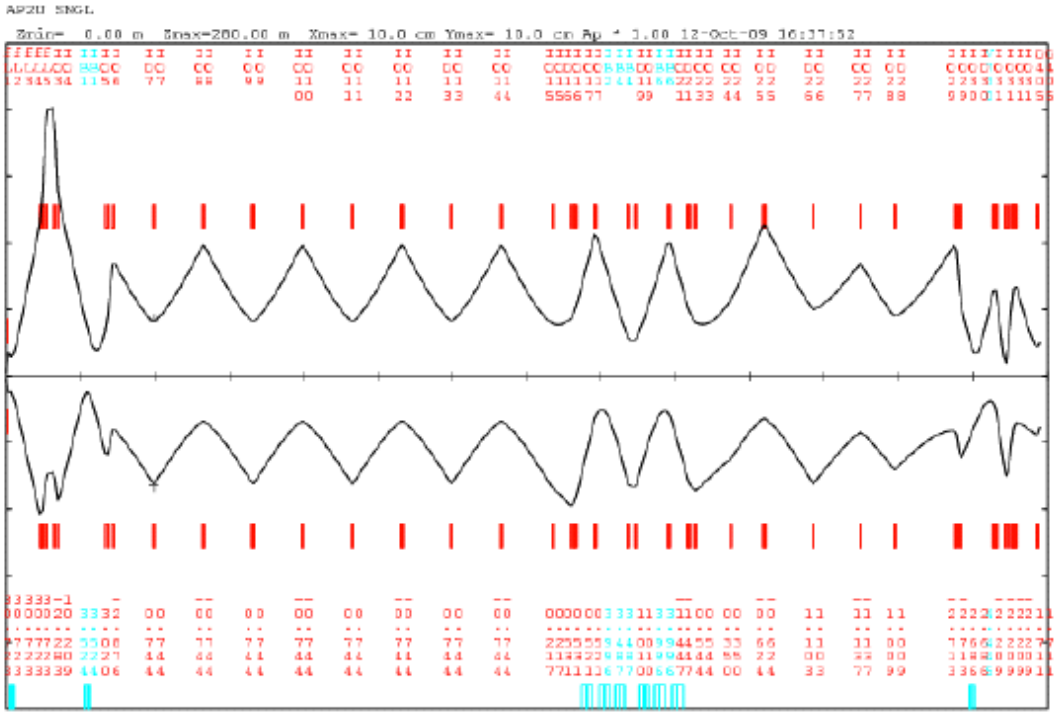
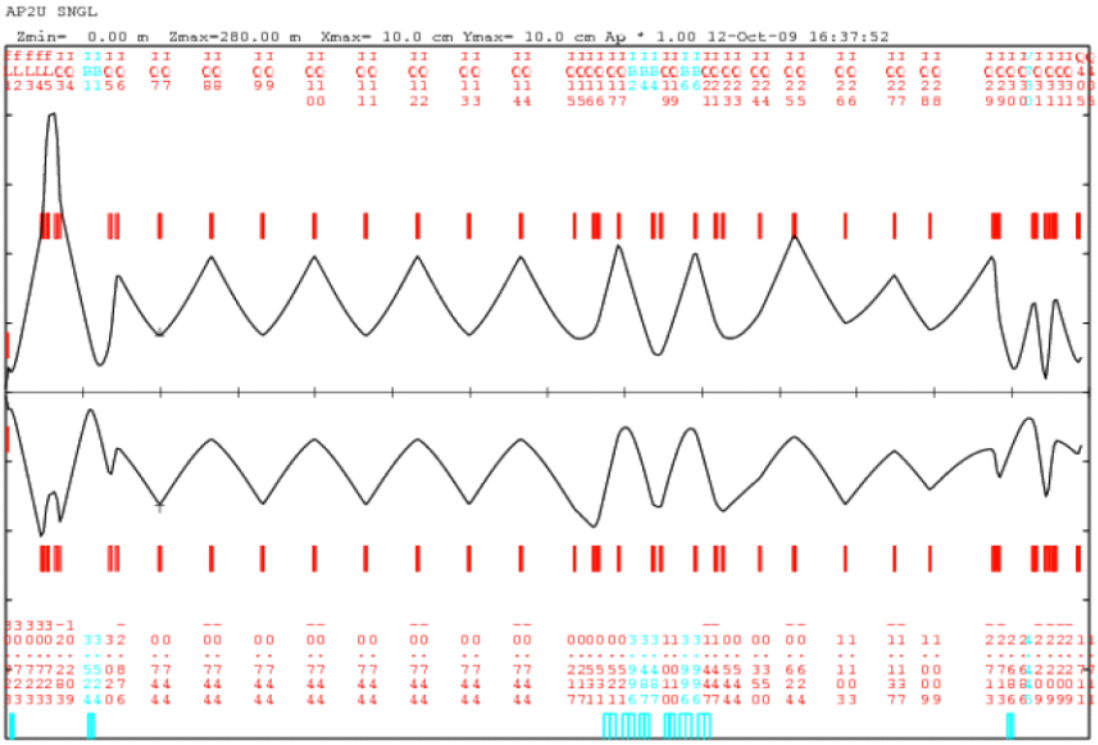
	Protons/pulse	Averager Rate	π acceptance	π->μ conversion	Total μ–rate
FNAL G-2	1e12	18Hz	1.2e-5	0.34%	7.3e5 Hz
AGS G-2	5e12	0.37Hz	1.0e-5	1.2%	2.2e5Hz

- Table is promising.
- Factor of 4.5,
- Go to 20e5, factor of 13-14 ahead of AGS, need a factor of 21.
- Not in here is increased decay length of the channel.
- Factor of 3 is consistent with what UI had.
- How many pions are we producing in the pipe.
- 80m decay length AGS vs 200m decay length Fermilab
- Unanswered question? What kind of acceptance can we achieve by adding quads. In the AP2 line, the four upstream most quads, those quads are close together and the beta function is high there and there appears not much we can do about it.
  - In left bends and in four US quads,
  - Due to large drift space in shielding from dump.
  - Target pile would be very difficult.
  - We will have to have a beamline design, then decay turtle or MARS to track particles.

        - Get Nikoli's Mars extended to first quad? Then go to decay turtle?
    - Paul's Numbers given already took this into account. Already did Decay Turtle, etc…
    - 

    - Lattice as-is
    - 

        - Aperture limited by pole separation of quads. To open the aperture, would require replacing quads with something different. Also, horizontal dispersion there.
            - If we can open up the aperture.
            - High rad area, so not trivial. Need cooldown time.
            - Would you have to mount from floor instead of schedule.
        - These pictures show that we have taken the beam from Nikoli all the way down.
        - To calculate difference of yield by changing quads. Must be done in Turtle. Maybe Mars?

        - Aperture is 3.5" on 4Q (current),
        - If make the aperture bigger, would have increased power supply.
    - Other concerns
        - Target area? Was a concern before.
        - Plan A has unquantitative risk
        - Plan B talking about it.
        - Need a more detailed relative yield calculation….need a MARS
        - Could be good to model both Plan A and Plan B. Nikoli already modeled Plan A.
    - Because this is a mature experiment, we are looking at things that a new experiment wouldn't be looking at.
    - Preparing for PAC presenation.
    - By Wednesday, need to have a run-through.
    - By end of Wednesday, have a roughed out presentation that people can look at and criticize.
    - Tony says,
        - If you have a longer focusing system (Plan b), you might need a more extended target
        - Nikoli wants a carbon target.